REMARKS

Filed concurrently with this amendment is a request for a 3-month extension of time, whereby the period set for response is extended from July 1, 2003 to October 1, 2003. A copy of the request is attached hereto.

As a result of this amendment, product claims 42 to 46 are now in the application.

New claims 42 through 46 are all directed to use of a zinc ionomer having specific properties. Additionally claims 43, 45 and 46 call for specific compounds that function as a UV light absorber and a UV light stabilizer.

Applicant believes that all informalities and issues of indefiniteness have been resolved, leaving open the question of patentability of Applicant's invention as defined by claims 42 to 46.

In the Official Action issued 01 April 2003, all of the claims then pending in the application were rejected under 35 U.S.C. 103(a) as obvious in view of the references cited by the Examiner. Reconsideration of the issue of patentability under 35 USC 103 (a) is respectfully requested for the reasons hereinafter set forth.

On information and belief, the references of record fail to indicate that modules produced prior to the present invention were capable of achieving the results achieved by Applicant, namely, modules that exhibit no loss in electrical photovoltaic performance after 1000 hours of exposure to 85% RH/85°C damp heat and after 20 cycles of change of conditions between 85%RH/85°C and 0%RH/-40°C. **The fact that Applicant has achieved modules with such performance stability is believed to rebut the Examiner's conclusion that Applicant's invention is obvious from the prior art.**

Accordingly Applicant specifically requests reconsideration of the rejection of his application on the basis of the references relied on in the Official Action, namely: Hanoka '382, Gonsiorawski et al '920, the DuPont MSDS and the

Performance Polymers Product Catalog, Hanoka '116, Kamimura et al "358, Hanoka et al. '042, Mientus et al '982, French '382, and Pern '757.

In requesting reconsideration, Applicant does not dispute a number of the Examiner's statements regarding what is disclosed by the prior art of record. More specifically, Applicant agrees that:

1. Hanoka '382 discloses a module that comprises a transparent glass front support sheet and a back support sheet, a plurality of solar cells disposed between those sheets, and the use of a zinc ionomer as an encapsulant.

2. Gonsiorawski '920 discloses use of Xersin 2005 solder paste with fluxing agent to improve aging properties of solar cell soldered connections.

3. The DuPont MSDS and the Performance Polymers Product Catalog reveal a number of different ionomers.

4. Mientus et al disclose modifications of ionomers with Chimassorb 944 and Tinuvin 328.

5. Kamimura shows use in a module of a glass made of a material that transmits light suiting the sensitivity of the solar cells.

6. Hanoka '116 shows monolithic connections for the solar cells.

7. French shows use of a scrim layer.

8. Pern discloses a method of forming laminated solar cell modules.

9. Hanoka '382 discloses use of a UV light absorber and a UV light stabilizer.

10. The physical properties of Surlyn™ 1702 and 1650 are similar to the Surlyn™ 1705-1 ionomer.

However, Hanoka '382 does not disclose or suggest a module having photovoltaic cells interconnected by soldered solar cell connections having an acidic flux residue and encapsulated by a zinc ionomer encapsulant that absorbs no more than 0.3 wt. % water.

Further regarding the issue of obviousness, it is important to note that the Surlyn™ 1702, 1650 and 1705-1 ionomers do not have identical properties, as is evident from a comparison of the properties of those materials as set forth in the

Performance Polymers Product Catalog. Moreover, the properties of those materials are similar to those of the Surlyn™ 1601 sodium ionomer that is mentioned in Applicant's specification and Hanoka '382. Since Applicant has determined that the Surlyn™ 1705-1 ionomer provides results substantially superior to that which was possible from the Surlyn™ 1601 ionomers, it follows that the differences in ionomer properties are significant. Therefore, Applicant's invention cannot be dismissed as obvious merely because the prior art shows a number of ionomers with similar properties. More specifically, it does not follow that merely because the materials have similar properties they would be expected to function equivalently. To the contrary, Applicant submits that it is unreasonable and only speculation to predict how a particular ionomer composition will behave as an encapsulant under the stressful environmental conditions encountered by solar cell modules in various installations and locations.

In this connection, it is important to note that Applicant's use of the Surlyn™ 1705-1 ionomer solved a problem of module degradation due to the presence of acid flux residues that existed with the Surlyn™ 1601 ionomer, a problem about which the prior art is silent, much less suggest a solution. Consequently it does not follow, as stated in paragraph 11 of the Official Action, that one skilled in the art would have had a reasonable expectation of success for the substitution of the Surlyn™ 1705-1 ionomer for the Surlyn™ 1702 or 1650 ionomers, any more than it would have been expected that the Surlyn™ 1705-1 would provide results superior to what was possible with the Surlyn™ 1601 sodium ionomer. All of the foregoing needs to be considered in light of the fact that Applicant's use of the Surlyn™ 1705-1 zinc ionomer has improved results to the point of providing modules that exhibit no loss in electrical photovoltaic performance after 1000 hours of exposure to 85% RH/85°C damp heat and after 20 cycles of change of conditions between 85%RH/85°C and 0%RH/-40°C. Nowhere in the prior art of record is there any indication or suggestion that such an improvement in module performance can be achieved by selecting one form of known ionomer instead of another known ionomer.

New claims 43, 45 and 46 are all restricted to specific UV light absorber and light stabilizer compounds. Although Mientus et al '982 mention the same compounds, Tinuvin 328 and Chimassorb 944 as additives for ionomers, they also mention other compounds from the Tinuvin and Chimassorb families of compounds. Moreover, they do not specifically combine Tinuvin 328 and Chimassorb 944 with each other or with the Surlyn™ 1705-1 zinc ionomer. Applicant submits that the selection of a UV light stabilizer and light absorber for use with an ionomer solar cell encapsulant is more than a mere matter of choice, since whether or not a selected light stabilizer and absorber will interact with one another, or whether such compounds will or will not adequately protect the ionomer encapsulant, is important. Applicant submits that his selection of the particular stabilizer and absorber compounds listed in claims 43 and 45 needs to be evaluated with full consideration and appreciation of the fact that modules made with this invention have proven to provide exceptional and unobvious results, as mentioned on page 14 of the instant application.

Moreover, Mientus et al are not concerned with solar cells, but rather with providing laminated materials for the non-analogous electrographic industry. Applicant submits that one interested in making solar cells would not look to the electrographic industry for a suggestion of what ionomer to use in a solar module for the purpose of preventing module deterioration due to ionomer interaction with an acid flux residue, or for what UV light absorbers and light stabilizers will assist the ionomer without interfering with its resistance to acid reaction or to variations in the environment in which solar modules are designed to function.

With respect to claim 46, Applicant acknowledges that thin film cells are old. However, claim 46 depends from claim 45 and is believed to be allowable for the same reasons as claim 45.

To reiterate, what is not obvious to a person having ordinary skill in the art, and is addressed for the first time by this invention, is the fact that acidic flux reactions with ionomers can shorten the useful life and reduce performance of photovoltaic modules containing such ionomers as encapsulants, and also that

Applicant has substantially reduced the problem of module deterioration to a negligible level by using a particular zinc ionomer as the cell encapsulant. Further by way of summary, Applicant's invention provides an unexpected and new result, namely, solar cell modules that have passed stress tests of 1000 hours at 85% relative humidity and 85°C damp heat, as well as 20 cycles of temperature humidity cycling with the temperature ranging from 85°C to -40°. Also, in addition to showing no decreased electrical performance after such tests, the tested modules fully satisfy the safety criteria of the wet and dry high voltage withstand tests at 3600 volts as well as the insulation resistance criteria measured at 500 volts. These results have not been achieved previously with other ionomer encapsulants, and such results are not suggested by any of the prior art of record.

For the foregoing reasons, Applicant submits that the claims 42-46 now in the application define a patentable invention and should be allowed.

Prompt and favorable reconsideration is solicited.

Respectfully submitted,

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30 SEPTEMBER 2005
(date of deposit)

NICHOLAS A. PANDISCIO
(name of attorney)

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